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Device and method for filling containers

Description

The invention relates to a device for filling containers, in particular bottles, according to the preamble of Claim 1 and to a method for filling containers, in particular bottles, according to the preamble of Claim 6.

Devices and methods of the type discussed here are known. However, it has been found that particularly when the containers are being filled with perishable substance, in particular with beer, fruit juices or still mineral water, the substance with which the containers are filled becomes contaminated and therefore perishes rapidly, so that it is no longer suitable for consumption.

Therefore, the object of the invention is to provide a device and a method which do not have these drawbacks.

To achieve this object, the invention proposes a device which has the features listed in Claim 1. It is distinguished by a clean room in which the containers are filled. In this context, the term clean room means an environment within which the number of germs is extremely low and which is virtually free of substances which are hazardous to the perishable substance. A closure station is also provided in the clean room. Therefore, the containers are closed with a closure in the clean room, so that it is impossible for any germs to enter the container during transfer from the filling station to the closure station. The clean room is assigned at least a first cleaning lock, in which the containers are cleaned before they enter the clean room.

An exemplary embodiment of the device which is distinguished by the fact that a second cleaning lock is provided, which is used to clean the closures which are fitted onto the containers, is preferred. This also

ensures that it is impossible for any germs or the like to be carried into the clean room.

Further configurations are given in the remaining subclaims.

To achieve the object, the invention also proposes a method which has the features listed in Claim 6. It is distinguished by the fact that the containers are fed to a clean room, inside which they are filled, via a first cleaning lock, in which they are cleaned. The containers are also closed in the clean room, in order to prevent germs or other substances from being carried into the perishable substance.

Further embodiments of the method are given in the remaining subclaims.

The invention is explained in more detail below with reference to the drawing, in which the only figure shows an outline sketch, in the form of a block diagram, of the device for filling containers.

Figure 1 shows a device 1 inside which containers B are filled with a perishable substance. The device 1 has a clean room 3 which is distinguished by the fact that the number of germs per cubic metre of air and of other substances which have an adverse effect on the perishable substance are reduced to a minimum.

Inside the device 1 there is a filling station 5 in which the perishable substance is introduced into the containers B. The device 1 illustrated in this figure also comprises a closure station 7, inside which closures V are fitted to the filled containers B. The closure station 7 is preferably likewise arranged in the clean room 3, i.e. inside the device 1, in order to avoid germs or other substances from posing a risk to the perishable substance when the containers B are transferred from the filling station 5 to the closure station 7.

In Figure 1, a downstream cleaning station 9 is indicated in dashed lines inside the device 1. This is

used to clean the filled containers B, so that there is no perishable substance or other substances adhering to the outside thereof. Figure 1 indicates that the downstream cleaning station may also be provided outside the device 1. The cleaning station arranged outside the device 1 is denoted by reference numeral 11.

It can be seen from Figure 1 that a first cleaning lock 13 is provided, which is fed with the containers B to be filled. Inside the cleaning lock 13, the containers B are cleaned, preferably sterilized. The lock may comprise a blasting device and/or a gasification device, the blasting device being able to spray a liquid onto the containers B to be cleaned and/or to emit UV or radioactive radiation. Devices of this type are known, and therefore will not be described here.

The cleaned containers B are fed from the first cleaning lock 13 to the device 1 in such a way that there is no possibility of contamination of the containers B. The first cleaning lock 13 may therefore be directly connected to the device 1.

Figure 1 also shows a second cleaning lock 15 which is fed with the closures V which are used to close the containers B. Inside the second cleaning lock 15, the closures V are cleaned and/or disinfected; in this case too, it is possible to use a blasting device of the abovementioned type and/or a gasification device.

From the second cleaning lock 15, the closures V are fed to the device 1 in such a way that there is no possibility of contamination by germs or other substances.

A dashed line 17 indicates that on the one hand the first and second cleaning locks 13 and 15 may be combined to form a single lock, and on the other hand the two locks may be directly connected to the device 1, in order to be able to ensure that the cleaned

objects are transferred securely, i.e. with protection against contamination.

The objects to be cleaned, i.e. the containers B and the closures V, can therefore be cleaned in the associated cleaning locks by a gasification device which emits ozone, for example, or by means of a blasting device. The blasting device can release a cleaning liquid onto the objects to be cleaned or can emit UV radiation or radioactive radiation. Following the cleaning by means of an active washing liquid, it is possible to carry out downstream cleaning using a neutral medium, in order to eliminate all residues of the cleaning liquid. The downstream cleaning preferably takes place outside the clean room, which can thus be of relatively compact design.

The way in which the device 1 functions and the method for filling containers will be dealt with in more detail below:

In the interior of the device 1, namely in the clean room 3, containers B are filled with perishable substance, for example with fruit juices or with mineral water which has a low carbon dioxide content or contains no carbon dioxide, in a filling station 5. In the latter case, therefore, the disinfecting action of carbon dioxide is absent.

To prevent germs from being introduced into the containers B, the containers B and preferably also the closures V are cleaned and/or disinfected in cleaning locks 13 and 15 or, if appropriate, in a common cleaning lock (cf. line 17). The containers B are then fed to the filling station 5, the closures V to the closure station 7. In this way, it is possible to fill the containers B with perishable substance and to prevent germs or other disruptive substances from being entrained. Therefore, with the aid of the device 1 and the method explained here, it is possible for containers B to be filled without there being any need for heating of the substance to be introduced. On the one hand, this contributes to the flavour and

constituents, in particular vitamins, of the substance with which the containers are to be filled not being impaired, and on the other hand it is possible to save on the energy required to heat the substance. Ultimately, the method and device contribute to reliably achieving the minimum shelf life required, and in many cases this shelf life can even be extended, in some cases considerably.

The closed containers B may also be cleaned in a downstream cleaning station 9 inside the clean room 3. However, it is expedient for the downstream cleaning to be carried out outside the device 1 or the clean room 3, in a downstream cleaning station 11.

Overall, it becomes clear that the device 1 is of very simple structure and that it is possible to use standard cleaning and disinfecting methods for cleaning and disinfecting the objects which have been introduced into the clean room 3, namely the containers B and if appropriate also the closures V, in such a way that there are no germs or other substances entrained into the perishable substance.

The explanations given also make it clear that it is simple to produce cleaning locks 13, 15 which can be directly integrated in the housing wall of the device 1 or can be fitted to this wall. Germs cannot enter the clean room 3 or the area on the other side of the housing wall, since the only access is through the cleaning locks.

In the end, it can be seen clearly that in the device described here or when carrying out the method explained, containers are filled and closed in a clean room. In doing so, at least one cleaning lock is used to ensure that the objects which are introduced into the clean room, in this case therefore the containers and the closures, are cleaned, so that it is impossible for germs to be introduced. It can easily be seen that it is possible to use a cleaning lock which is provided for both the containers and the closures, but that it

is also possible to provide separate cleaning locks for the two elements.

The device and the method are suitable for containers and closures of all types. However, it has emerged that in some cases there are areas of closures which are not readily accessible and in which it is possible that there may still be germs. Therefore, it is preferable to use particular types of closure which are of very simple structure, i.e. from which germs can be completely removed very easily during a cleaning operation.

The particular closures of the type discussed here are, as it were, simple closure caps, also referred to as sealing caps, which can be fitted onto the container in the interior of the clean room and reliably close this container. The containers are then preferably definitively closed outside the clean room by a closure element being fitted to the closure cap. This may be a conventional plastic screw-type cap, a crown cap, a twist crown cap or a standard metal screw-type cap. Screw-type caps of this type are fitted onto the container which has been provided with the closure cap and are then subjected to a forming operation in which a thread is rolled into the lateral surface of the screw-type cap. Forming processes of this type are generally known and therefore need no further explanation here.

It is also essential that closure caps which are preferably of simple structure are used, without any undercuts or areas in which germs or the like may remain during a cleaning operation, thus constituting a hazard to the filling substance. The containers can be securely closed by means of the closure caps, so that contamination of the container content is reliably avoided even after they have been taken out of the clean room. The containers are therefore easy to handle without risk of the contents being damaged and can be definitively closed in the manner referred to above.

The closure caps may consist of plastic, of plastic-coated metal or of a plurality of materials.

Preferably, the closure caps are fed to the cleaning lock in a defined orientation, so that it is impossible for any liquid residues to collect in the closure cap during cleaning with a liquid cleaning or disinfecting agent.

The simple structure of the closure caps, which in fact have no undercuts or the like is also advantageous for cleaning methods using jets and beams of all kinds, since all areas of the closure cap can be reliably reached and germs and the like are killed.

During cleaning of the closure caps which are held at a particularly selected orientation, it is possible to ensure that cleaning liquid does not collect in recesses or the like. Consequently, drying processes which follow the cleaning operation can be carried out particularly efficiently and quickly.

During cleaning of the containers and the closures or closure caps, it should be ensured that the materials of the parts to be cleaned are not impaired and that the taste of the substances or liquids with which the container is filled is not adversely affected either. By way of example, peracetic acid and/or alcohol can be used for the cleaning.

The device described here and the method explained can be used particularly effectively for filling containers with readily perishable substance, in particular with beer, fruit juices and mineral water with a low carbon dioxide content or without any carbon dioxide. In this case, it is preferable to use the closure caps described which are referred to as sealing caps, since such caps can be cleaned very thoroughly.